Mine Warfare Systems Engineering

NAVSEA
PANAMA CITY
Coastal Systems Station

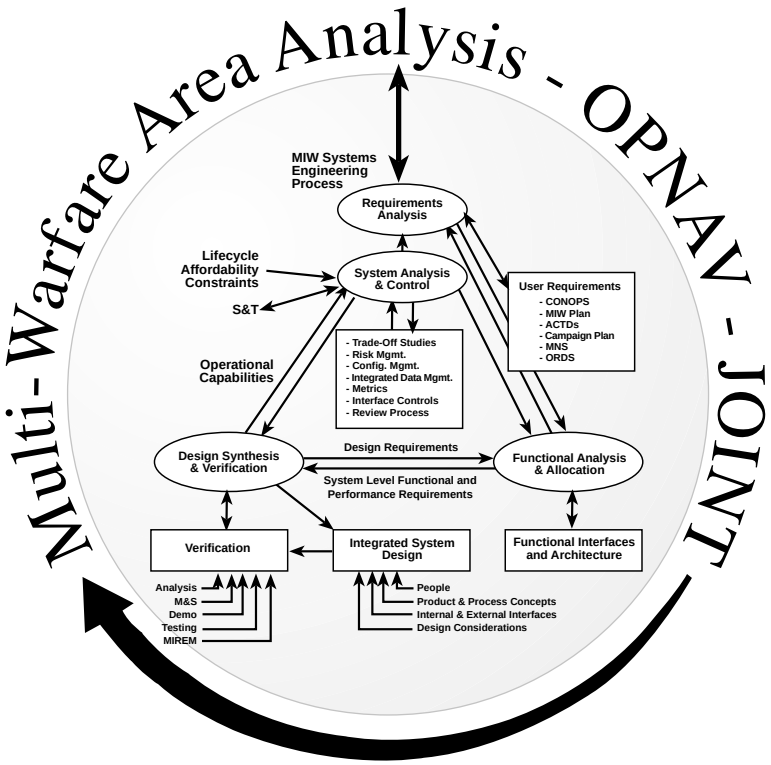
Naval Sea Systems Command

NAVAL SURFACE WARFARE CENTER

DAHLGREN DIVISION

Overview

For the U.S. Navy, mine warfare is changing. No longer a dedicated force of ships and systems that must be called upon when a mine problem arises–mine warfare is becoming organic–available aboard surface combatants and submarines. Led by NSWCDD Coastal System Station's Systems Engineering Group (SEG), mine warfare systems engineering is the application of sound systems engineering processes to the entire warfare area, providing a consistent, comprehensive view across all of mine warfare to ensure a robust mine warfare capability is delivered to the Fleet.



Mine Warfare System of Systems

In 1992 naval mine warfare embarked on a new path to the future. This path entails a re-examination of all facets of mine warfare. One of the tools for this reinvention is the application of systems engineering principles across the warfare area. The mine warfare community has established a process based on Department of Defense Regulation 5000.2-R, executed through application of the Institute of Electrical and Electronics Engineers Standard 1220-1994, and is flexible in its use.

Linkage to Naval Warfare Analysis

The naval mine warfare systems engineering process provides the linkage to the overall naval assessment and requirements generation process and ensures the flow-down of warfighters' needs is addressed by mine warfare. This methodology provides for a comprehensive, consistent, and effective view across all of mine warfare for:

- Requirements Analysis
- Functional Analysis
- Design Synthesis
- System Analysis
- Test and Evaluation
- Supportability

The resulting quantitative information provides a firm foundation for the mine warfare decisionmakers.

Community Involvement

This systems engineering process is executed under the auspices of a focused community-wide decisionmaking body, the Acquisition Coordination Team. This approach helps to ensure representation of relevant concerns, a thorough understanding of cause and effect, and specialists' interests. The Program Executive Officer for Mine Warfare provides tasking to the Systems Engineering Group (SEG), established at the Dahlgren Division's Coastal Systems Station. The task-oriented nature of this process enables the efficient use of resources and allows the SEG to bring in subject matter experts.

Mine Warfare Performance Metrics

The first product of the SEG, released on 13 January 1997, was PEO (MIW) Notice 3370, Mine Warfare Standard Metrics. This notice established a standard set of measures of performance and effectiveness for use across the community. This was the first concrete step in providing consistent, quantitative descriptions and comparisons across mine warfare. These measures are used by the community to assess mine warfare systems and tactics. The Mine Warfare Readiness and Effectiveness Measurement (MIREM) program uses the Notice in its evaluation process.

An assessment of current and near-term future mine warfare capabilities was recently performed in order to establish a baseline from which future improvements may be measured.

Mine Warfare in the 21st Century

The SEG has initialed an effort to develop a Capstone Requirements Document (CRD). This CRD defines, at a high level, the MCM requirements for standard MCM operational situations. For the DoD, it is a bridge between multiple mission need statements (MNS) and Service Operational Requirements Documents (ORDs). The CRD is also intended to be used as a source document for developing future system architecture alternatives. The SEG has also begun an assessment of Mine Warfare C4ISR. This study includes defining the specific Mine Warfare information that is required to be passed between platforms as well as an assessment of the adequacy of current and projected future C4ISR systems to pass the required information.

As Mine Warfare begins to transition to a capability that is organic to the Fleet, the optimum force mix between organic and dedicated assets is required to ensure effective integration into the national security "system of systems." The systems engineering processes established will help to ensure a coherent and executable strategy.

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